S
581
3

THE TEXTILE WORLD RECORD
KINK BOOKS

No. 10

Kinks for Cotton Superintendents

Compiled from the
QUESTIONS AND ANSWERS DEPARTMENT
of the
TEXTILE WORLD RECORD
for its subscribers only

PRICE 75 CENTS

LORD & NAGLE COMPANY
Publishers
Boston, Mass., U. S. A.

THE LIBRARY OF CONGRESS
1800

Class TS1581
Book T3
Copyright No.

COPYRIGHT DEPOSIT.

L

F

nes

S

Spinning Frames
Spoolers and Reels

Saco and Pettee Machine Shops

WORKS, NEWTON UPPER FALLS, MASS.
BIDDEFORD, MAINE

Southern Agent

A. H. WASHBURN, Charlotte, N. C.

HOW TO UNRAVEL KINKS

IN HUMIDIFICATION

WRITE
TO THE

AMERICAN
MOISTENING
COMPANY

79 MILK ST.
BOSTON, MASS.

FOR THEIR BOOKLET T. DESCRIBING THE

COMINS
SECTIONAL HUMIDIFIER

Absolutely Simple
Practically Efficient
Easiest to Control
All Parts Instantly
Accessible

OVER 70,000 OF OUR
HUMIDIFIERS IN USE

WM. FIRTH,
President.

FRANK B. COMINS,
Vice-Pres. and Treas.

THE TEXTILE WORLD RECORD
KINK BOOKS

No. 10

Kinks for Cotton Superintendents

Compiled from the
QUESTIONS AND ANSWERS DEPARTMENT
of the
TEXTILE WORLD RECORD
for its subscribers only

LORD & NAGLE COMPANY
Publishers
Boston, Mass., U. S. A.

TS1581
.T3

Copyright, 1909
LORD & NAGLE COMPANY
Boston, Mass.

10-2954

© Cl.A256059

PREFACE

The editors of the TEXTILE WORLD RECORD are at all times face to face with the problem of securing practical information. For years its subscribers have been invited to make free use of its columns in asking questions relating to cotton manufacturing, and it has occurred to us that if some of the most important and most interesting of the practical questions that have been answered were gathered together in a handy form for quick reference, it would meet a wide-spread want.

This book is the result. It contains information which has been supplied by manufacturers, superintendents, and overseers from their private note books and their stores of knowledge gained by experience.

Many questions are answered and much information given in this book, but subscribers should remember that if there is any information they desire which is not given in this volume, it is their privilege to ask the Questions and Answers Department of the TEXTILE WORLD RECORD, and every effort will be made to publish the information for them provided the question is one of general interest to the trade.

No effort has been made to arrange the subjects in the order of precedence in manufacturing, but the book is fully indexed, which should enable anyone to find the information he seeks in the shortest possible time.

Grateful acknowledgment is due to the men who have supplied the information, and if Kinks for Cotton Superintendents should benefit any of the large number of men for whom it is intended, both they and the publishers will feel that its mission has been accomplished.

TEXTILE WORLD RECORD
LORD & NAGLE COMPANY
Publishers

KINKS FOR COTTON SUPERINTENDENTS

The Cost of Starting Up a New Mill

What allowance should be made for the cost of starting up a new mill on cotton goods? I mean what is estimated to be the cost of getting machinery in good running order.

Works (1683).

A most intangible but a very real expense incident to the cost of a new textile mill and equipment is that concerned with starting up. Only after a period of several months can the entire plant be brought into a condition approximating maximum efficiency. There are wastes on every hand, not only those resulting from absolute errors or slight inaccuracies in the setting, but a host of minor losses — in material, in power and in human effort that in the aggregate mount up to a considerable sum. In a recent report F. W. Dean, mill engineer and architect, Boston, makes an allowance of no less than $10,000 for the single item of "starting up," aside from that of erecting, in the case of a mill equipment costing about $200,000 — an amount equivalent to 5 per cent. of the total cost. During the tuning up process frictional losses in shafting, belting and machinery are excessive, the operatives, although generally experienced, have to accommodate themselves to new conditions, there are recurring breaks and stops, with a resulting excess of poor work. All these combine to increase the unit cost of production to an extent that should not be overlooked. It has been estimated that in a textile mill fully one-half of the operating expense for three months should be charged as the cost of starting up.

Dressing for Dyed Cotton

Please let me know what is put on dyed cotton to make it run well. Philip (484).

This question, like the poor, is always with us. It is best to put nothing in the cotton if it can possibly be avoided. The best way is to dye with the substantive or direct colors when dyeing raw stock. Avoid the use of basic colors or cutch unless there is some special call for them; neither use the sulphur colors unless there is a special demand for fastness. However, if colors of a harsh nature, such as cutch or the sulphurs, must be used in order to get a special shade or a required fastness, then wash well, give three or four pounds of cotton softener or the same amount of soap, and dry. If Philip is using logwood to get his black, it should be aged over night, washed in the morning and then softened with three pounds of the softener to one hundred pounds of stock.

Do not run the dyed colors on the cards until they have regained the natural moisture lost in drying. Many carders try to run dyed cotton right from the dryer, and have a good deal of trouble on this account. I have found that dyed cotton will run better if it is not carded for a week or ten days after dyeing.

In the card room there are various methods used to help in the running of the cotton when it is harsh or charged with electricity. Among them are these:

Sprinkle the cotton with water with a broom or garden sprinkler; some use steam jets set in or near the card alleys, also humidifiers; some carders sprinkle ammonia water in the alleys; others make up 50 gallons of a solution with 25 pounds of Turkey red oil and the same amount of Glauber's salt or common salt, and then sprinkle the cotton with this before it is picked. The better way, however, is to use nothing at all if it can be avoided. Use only those colors that leave the cotton soft; do not work the cotton too long in the dyebath, and in fact, leave the cotton as near its natural state as possible. Some carders set the cards coarser for colored cotton than for white. Baumwolle.

Combing Cotton

We have a mill among our customers making 12s to 24s combed yarn and have been selling them hard Southwest Georgia and Alabama cotton 1 1-16 staple, fully good middling to middling fair, well selected for character. They say they prefer the softer North Georgia cotton, as it cleans better We cannot believe combed yarns can be as good made out of the soft inch cotton, as they say they are taking out 20 per cent. waste. Will you let us know about this?

Alabama (1086).

Generally speaking such cottons as Sea Island, Egyptian, and the long-stapled upland cottons, which have a soft, silky and pliable fiber, are better suited for combing than cotton having a hard and more brittle fiber. There is, however, another point which must be taken into consideration, namely, the length of the fibers and the grade.

The count of yarn being coarse in each case, and the grade and length of fiber being 1-16 of an inch greater in the Alabama and Southwest Georgia cottons, a grade of fully good middling to middling fair should undoubtedly give a good yarn. If a soft, pliable and smooth yarn is required, there is no doubt that the softer cotton is more desirable. There need be no trouble in producing 12s to 24s yarn from combed inch cotton. If a premium is paid for the extra staple used in the first case, this will reduce some of the extra cost of combing the shorter fiber. The resultant thread will be much better adapted for hosiery yarn.

Bolster.

Repair Shop for Cotton Mill

We are thinking of adding a repair department, and as superintendent this will at first come under my direction. Not having had experience in matters of this nature I would appreciate any points you may give me.
Repair (1674).

I will select a mill of 28,000 spindles and 700 looms as a basis for my remarks. The location of the shop is the first thing to be considered. It is a mistake to locate it in some out of the way place, in a dark corner or basement. The repair shop should be given as much consideration as any department of the mill. It should be easily accessible to all parts of the mill and should have good light and room enough to handle the work properly. It may be situated in a building outside of the mill as was the repair shop which impressed the writer as an excellent solution of the problem. The building was of concrete blocks two stories in height with the first floor concrete and the second floor planks on steel beams. The building had a truss roof covered with oiled canvas, there being no posts. All of the shafting was suspended from the ceiling of the first story, the machines on the first floor being driven from overhead and those on the second floor through the floor. The blacksmith shop was at one end of the first floor, separated by a concrete wall from the rest of the floor, which was used for the machine shop. The second floor was used for the carpenter shop and had a room partitioned off for an office for the master mechanic with a large window back of the draughting table. This is but one of many examples of convenient arrangements that are possible.

If the mill is driven by electric power, an independent motor is the proper thing, arranging the mill with connections so as to take power from outside sources. This is very convenient in case the mill is not running and there is no steam up. It is also a good plan to have a gas or gasoline engine. In the absence of this auxiliary there should be a small steam engine which can be run in case of a breakdown. Another very convenient power appliance is a small dynamo for lighting the repair shop in case of night work.

The machine equipment of a repair shop depends largely on the equipment of the mill, and as far as possible should enable the repairs to be made without aid from the outside, except for foundry work. Following is a list of useful machines: A lathe that will handle pulleys up to 60-inch diameter by 24 inch face; a shafting lathe that will swing 20 feet between centers with a screw cutting attachment; two engine lathes, 6 feet by 16 inches, both to have screw-cutting attachments and one of them to have taper turning and boring attachment; a speed lathe 48 inches by 12 inches; a universal milling machine; an upright drill, or better yet a radial drill; a planer 36 inches by 36 inches by 96 inches; a two-wheel wet emery grinder. For the carpenter shop: A circular saw; a hand saw; a buzz planer; a pattern maker's lathe; a boring machine; and a grindstone. For the piping and plumbing: A 6-inch pipe-cutting and threading machine. For the blacksmith shop: A good power blower; a bolt threading machine; a nut tapping machine. There are, of course, other machines that under certain conditions add to the economical efficiency of the shop. For example, in one mill there was a turret lathe, which was kept busy from 45 to 50 hours a week. In another mill there was a turret lathe that was not running over 10 to 15 hours a week, in which case the machine would not pay the interest on the investment.

The number of machinists, carpenters and other help needed varies in different mills. Following is an estimate: A machinist to look after the card room work; one for the spinning room; one for the weave shop; one for the cloth room, dye house and all around work; two carpenters to care for endless belts and wood work; a blacksmith; a piper and an all around man for helper wherever needed. These make a good complement of help for a mill of the size named. Canterbury.

Roller Cloth

Please advise us what 22-ounce roller cloth is used for? We understand that the ordinary weight for roller cloth is 16 and 18 ounces and we would like to know for what special purpose the 22-ounce cloth is used. Richmond (1024).

Twenty-two ounce roller cloth is now extensively used on drawing frame rolls for fine, long staple cotton; also on comber rolls and the sliver and ribbon lap machines when used on fine work. The object of using cloth of this weight is to give more of a cushion to the leather covering during the drawing of the thin film of delicate fibers, such as are found in long staple cotton. On some of the modern high production combers using very wide laps, a 24-ounce cloth is used on the detaching rolls so as to obtain a uniform and delicate grip upon the fibers during the detaching operation.

Bolster.

Strength of Mercerized Yarn

Kindly inform me as to the breaking strength of a combed and gassed Egyptian mercerized yarn, 120 yards, skein 1½ yards, circumference 80 ends. The yarn has 15-16 turns per inch. The yarn measures 2-102 after gassing and mercerizing, and probably was not more than 2-94 before, but loss of weight in process brought it to 2-102. Bolton (540).

This is a subject on which there seems to be very little reliable information. One spinner to whom the question was referred writes as follows:

"I do not think 8 or 10 per cent. is any too much to allow for the increase of lengths or count in mercerizing. A 2-80s yarn twisted in the opposite direction to the twist in the single yarn will appear to be a 2-88s at the end of the mercerizing process, as the yarn in this process is subjected to an even greater tension than in the twisting operation. Very little is known about the breaking strength of yarns, not mercerized only, but all other ply yarns. The breaking standard of single 80s is 24.6, but very few mills keep it to this. It may break anywhere from 20 to 24.6 pounds. Two threads of 80s should have a breaking strength of 49.2 pounds, but if they are twisted together their strength is increased anywhere from 10 to 20 per cent. according to the number of turns per inch. According to this idea, a 2-80s yarn should break at 54 to 60 pounds. I do not know that this is correct, as I have never put it to the test, but am trying to find some rule that will answer the purpose. Gamaliel Gaunt.

Temporary Protection for Invention

Please inform me of the best and cheapest way to get temporary protection for a new device. I have several improvements which I would like to protect before bringing them to the attention of people who might wish to buy and use them. Detroit (765).

Temporary protection for a new device, before patenting, can be obtained by means of a caveat. A caveat is a description of an incomplete invention, which an inventor who desires time to complete his invention may file in the patent office on payment of the proper fee. It entitles the inventor to notice, within one year, of the filing of an application for a like invention. After such notice, the inventor must file a complete application within three months, or lose the benefit of the caveat. If the subject of the caveat has already been patented, it will be recorded, but not further noticed. No caveat should be filed if the inventor believes his invention to be complete. The government fee for filing a caveat is $10, besides the recording charge and patent attorney's charge. We would advise Detroit to consult a reputable patent attorney, whose services would be well worth their cost in insuring protection.

Equipping a Cotton Warp Spinning Plant

I would like a list of the machinery necessary to equip a cotton warp spinning plant with a capacity of 500 pounds daily, the size of the yarn varying from 10s to 30s; also the price of the same. Benton (791).

The machinery necessary for a plant of this kind will depend on how the warp yarn is to be disposed of after leaving the spinning frames; that is, whether on section beams, weavers' beams, or on skeins, ball warps, chain warps, etc. We will assume that the spinning and preparatory machinery are required to put the yarn on section beams ready for the slasher. Five hundred pounds a day is specified and we will consider 20s the average count to be spun. This will require about 1,400 ring spindles, and each must produce 2 1-8 pounds a spindle a week; this will call for 5 frames of 280 spindles each, with a one-inch front roll running at about 130 r. p. m. and a spindle speed of approximately 9,000 r. p. m. About 150 roving spindles will be necessary to supply these machines. Then with a 1 1-8-inch roll making 140 r. p. m. and a spindle speed of 1,000 r. p. m., about 20 pounds a spindle will be produced, and a 2.5 hank roving could be used.

About 52 intermediate spindles will be needed each producing 61 pounds of one hank roving, with a front roll of 1 3-16 inches making 156 r. p. m., and a spindle speed of about 750 r. p. m. In connection with the slubber the shortest frame usually made for actual mill use is about 30 spindles and a frame of this length would keep the plant supplied with slubber roving by producing 130 pounds a spindle of .45 hank slubbing. This would call for 145 r. p. m. of a 1¼-inch front roll, and a spindle speed of approximately 500 r. p. m. The draw frames could be used as one frame, having three heads of five deliveries each, each producing 785 pounds a week, with a 2-inch calender roll making about 195 r. p. m. on a sliver weighing 60 grains per yard.

Using a 27-inch doffer on cards making 12 r. p. m. and making a 60 grain sliver, the production would be about 800 pounds card a week, and 5 cards could be used.

One finisher picker and one breaker picker would be required and if the stock needed more cleaning than the two processes would give, then the finisher picker could be used as an intermediate picker also and the stock passed through it twice. On account of the low production the finisher picker could easily fill the place of the intermediate.

The first cost of so small a plant would be proportionately more than if the plant were three or four times larger, as there are several machines required which would supply a much larger plant, while the cost would be the same in both cases. The cost will be about as follows:

1 breaker picker and automatic feeder	$840.00
1 finisher picker	750.00
5 cards at $650.00 each	3,250.00
15 draw frame deliveries at $60.00 each	900.00
30 slubber spindles at $15.00 each ..	450.00
52 intermediate spindles at $10.75 each	559.00
150 roving spindles at $6.75 each ...	1,012.50
1400 ring spindles at $3.25 each	4,550.00
100 spooler spindles at $3.00 each ...	300.00
2 warpers at $250.00 each..........	500.00
	$13,111.50

The power required for this machinery with an allowance for shafting, etc., will be approximately 50 h. p., and the power plant would probably cost about $2,000 to equip.

This, together with an allowance for sundry supplies, belting, etc., will bring the cost to about $16,500. J. T. B.

Production of Cotton Machinery

If a fine speeder or jack frame was run continuously for 58 hours without a stop, turning off 50 hanks, what per cent. of loss should be allowed for doffing, piecing up broken ends, cleaning, etc.? Hartford (989).

The percentage of efficiency usually obtained from the machines in the preparation processes for cotton yarn is among the most variable items in the mill. On similar goods the production may vary considerably, owing to the conditions under which the machines are run. The following, however, will give an approximate percentage under average conditions: On fine speeders or jack frames a production of 90 per cent. is considered satisfactory when running below 8 hank; from 8 to 15 hank, 92 per cent. may be obtained; and over 15 hank roving from 92 to 95 per cent. should be obtained under good conditions. On intermediates the production is usually about 90 per cent., while on slubbers the weekly product will vary from 83 per cent. to 90 per cent. of theoretical production, depending upon stock used and hank slubbing being made.

Drawing frames usually give from 75 to 80 per cent. of possible product, and this is determined by the care given to setting the various stop motions in addition to the quality of stock being worked.

Combers will give from 90 to 95 per cent. production, and the ribbon lap machine about 90 per cent., while the sliver lap machine is considered satisfactory if 70 per cent. of the theoretical production is obtained.

The cards should, under good conditions, give 95 per cent. production, if continuous running is considered, not including time lost in grinding and setting, but including stripping.

When making allowances for the pickers, it is customary to consider 50 hours as one week's work, because these machines can be made to accommodate a wide range of work. With the above allowance, the production would represent from 84 to 85 per cent. of a week's possible production on a basis of 100 per cent being the theoretical amount for 58 hours.

In the spinning room from 93 to 95 per cent. production is expected under favorable conditions. Bolster.

"Double Spun" Cotton

What is the meaning of "Double Spun" on the labels of some cotton yarn that I have seen imported? Spinner (1073).

In Lancashire the words usually imply that the yarn has been rereeled and picked after spinning. There are commission firms specially equipped for the work who charge 2 to 4 cents a pound for removing all bad ends, snarls, etc., and putting good yarn into perfect condition.
Egyptus.

Effect of Sizing on Cotton Yarns

The articles on "The Sizing of Cotton Yarn" in your recent issues were very instructive, particularly to a new manufacturer. In this connection I would like to ask what effect, if any, a heavy sizing has on the strength and elasticity of cotton yarn. If they are affected by the sizing, naturally the oftener a break would occur on any machine using such yarn. I would like to know what increase in weight there could be without in any way affecting the quality of the yarn. Ogden (837).

Heavy sizing undoubtedly has an effect on the strength and elasticity (or more correctly speaking, pliability) of yarns.

How much difference it makes depends on: 1. The percentage of size which is put on the yarn. 2. The kind of "feel" required in the woven cloth.

It is not usual to size yarn heavily, that is over 36s to 40s counts. The percentage of size put on the yarn will make it weave badly when it becomes excessive. Yarns below and up to 32s counts can be sized up to about 80 per cent.

without making an appreciable difference in the weaving, providing the size has been made with the simple object of increasing the weight and obtaining good weaving results. After 80 per cent. there begins to be an appreciable difference. This difference is accentuated with every increase in weight. When 150 per cent. has been reached the yarn will break far oftener than where there is 80 per cent., no matter how the size is made, or treated.

At the same time it must be pointed out that anyone trying to put 80 per cent. of size on the yarn would require to have a mixing where the various ingredients are nicely balanced to get good results. Otherwise the weaving would suffer. If the size contained too much starchy matter, or was short of softeners, the yarn would be harsh and brittle. If the proportion of chloride of magnesium was deficient, or in excess, the yarn would be too dry or too damp. Again a well-balanced mixing might easily be spoiled by not being sufficiently well boiled. If the yarn is overdried after the size has been applied bad results will follow in the process of weaving.

The feel required in the woven cloth is the factor which may make the greatest difference in the weaving of heavily sized yarns. There are certain makes of sized cloths of which the buyer judges the value by its feel. The feel is ascertained by taking the cloth between the thumb and fingers and drawing them along the cloth. Some buyers require a leathery feel; others a boardy feel. Sometimes a hard, harsh feel is wanted.

A cloth meeting the buyer's requirements in feel will always sell for a higher price than one made to the same particulars in regard to width, length, picks per inch, counts of yarn, and weight of piece, but not having the desired feel. To obtain feels that are foreign to the nature of cotton yarns means using ingredients that, though they give the desired result, are not good weaving ingredients.

I have known cases where it was practically an impossibility to make yarn with 70 per cent of size weave as well as other yarns with 140 per cent. Both were made from the same yarns and to the same particulars. The difference in the weaving has been solely due to the feel required in the woven cloths. It may be taken as an axiom that the harder or rougher a cloth feels the worse it will weave. The softer (providing it is not too soft) and smoother the feel, the better the yarn will weave. Dusty yarns will also weave better than yarns free from dust. Yet soft, pliable, dusty cloths would not obtain repeat orders in the sized cloth market. To obtain repeat orders and high prices every effort must be made to suit the buyer's requirements, and this means sacrificing other things at times. F. Scarisbrick.

English Cotton Checks

I am much interested in your September article, Textiles in Yorkshire. We manufacture fancy cotton goods and have already encountered in this market the shepherd check which you illustrate and which is sold for nine cents per 26½-inch yard (English export price). We have not been able to get a sample, but the buyers are much pleased with the fabric, finish and price, which, they say, are superior to the domestic goods. Will you send me a sample of the fabric that I may see how it is made?

Hoosac (481).

After the receipt of this inquiry we analyzed the English sample. Hoosac informs us that it differs from his fabric in an important particular and that an examination of the English cloth has shown him how to change his own in order to reduce the cost and improve the fabric and finish. Following are the results of our analysis of this fabric which will doubtless interest cotton manufacturers generally:—

Warp, 83 threads per inch.
    Black, 1-36, finished count.
    White, 2-80, finished count.
Filling, 62 picks per inch.
    Black and white, 1-103 finished count.
Weight, 10½ yards 26½ inches wide per pound.

The cloth has been mercerized which gives it the peculiar finish mentioned by the American buyers.

The results of this inquiry illustrate the great importance to manufacturers of an analysis of competing fabrics. The above analysis and an examination of the sample, give to a manufacturer all the information he requires to duplicate the goods, and may, as it has done in Hoosac's case, show him in what respect his own goods need to be changed in order to meet the requirements of the trade.

Hollow Space in Ply Yarn

Enclosed you will find a sample of threads being held together by adhesion of unvulcanized rubber such as we use in preparing our threads for the construction of various kinds of rubber goods. Each of these threads as per sample, was made of six strands of yarn twisted together. You will note in looking at the end of the threads as twisted by our machine that there is a hollow space in the center of the finished thread and the peculiar part of it, which we fail to understand, is that in taking four of these threads in twisting them together there is no hollow space in the center of the thread when finished. Five is not so bad, but above that number, six, eight or ten, the hollow space seems to enlarge with the number of threads used in the twist. What I want to know is a scientific explanation of this, whether it is due to our method of twisting, or whether this is the case in all cords or ropes manufactured by being twisted together with a certain number of yarns or threads?

Tubular (1114).

The tubular effect or "core" which is formed when six or more folded threads are cabled together to form one thread is quite usual if all the six threads are maintained at exactly the same tension during cabling, and it would be interesting to know if all the six threads have been run together on one bobbin prior to cabling or whether they have been on separate bobbins. Apparently the former has been the case, since on untwisting the yarn all six threads are found to take up the same amount. Naturally if an even tension is maintained each thread must take up a position side by side with its neighbor. Consequently when twisted the effect is somewhat like that of a twisted flat band whose width is equal to that of the combined diameters of the number of strands cabled together and the course of the threads is shown at Fig. 1. A section of Fig. 1 will show the threads, as in Fig. 2 A or Fig. 2 B, if the cabled thread is afterwards flattened which is the case in the sample submitted. It will be evident that the threads must of necessity take up such a position, since each thread at the same tension takes up the same amount during twisting and is twisted round a common axis. Each thread rests as it were on the preceding one, as will be

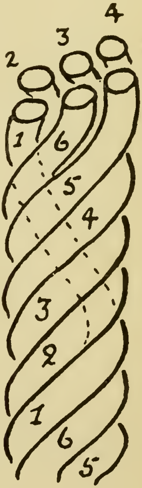

FIG. 1.

seen by Fig. 1. Therefore the section must reveal a hollow core. This core is present even when three or four threads only are cabled, but of course it is insignificant, as will be seen from the sections at Fig. 3, A and B. Naturally the more threads are twisted the greater becomes the core.

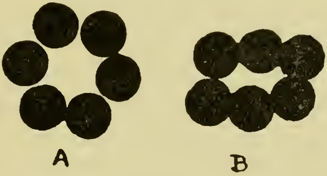

FIG. 2.

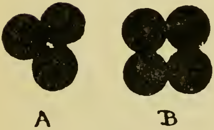

FIG. 3.

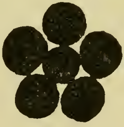

FIG. 4.

Evidently what "Tubular" requires is a cabled yarn with a solid core, that is, a yarn which would give a section like Fig. 4. Clearly, then, this thread which forms the core must remain straight throughout the length of the cabled thread and of course will take up practically nothing during twisting, while the remaining five threads being twisted round it take up a certain percentage according to the number of turns per inch and thickness of yarns. It must be evident, therefore, that to obtain this result the thread or threads (if more than one is required to form the core) must not be at the same tension as the others. They must be held tighter than the rest. Usually when cabling from separate bobbins this naturally takes place, as the pressure of the outer threads tends to force one or more to the center and of course this thread does not come off the bobbin at the same rate as the others and remains practically straight. If, however, the threads in the sample sent are being doubled in this fashion provision must be made for holding one or more bobbins tighter than the others. This will form a solid core, which is evidently what is required. Roper.

I have examined the samples with the more interest because I have never before noticed a hollow space in the center of ply yarn, but will give my idea of the cause, and the spinner of these yarns can easily put the opinion to the test. The threads show distinctly the hollow center mentioned and it must be due, in part at least, to the fact that they are loosely twisted, as an increase in the amount of twist entirely obviates the central space.

In twisting ply yarns together to form a thread of the nature of the sample, there is always a tendency for the ply yarns to lie edge to edge in the twisted thread, and unless they are twisted together very tight, the chances for forming the mentioned hollow centre are increased. This will not show up in using a small number of ply yarns for the reason that the diameter of the twisted thread is not larger than twice the diameter of the ply yarns composing it, thus allowing the ply yarns to touch in the center. In confirmation of the above opinion, anything over a three-ply rope will carry a central core around which the outer strands are twisted and against which their inner surface rests. In some cases this central core is composed of several strands. Steuben.

Mill Construction

Does the term "mill construction" indicate any particular specification, or is it a general term? Term (562).

Mill construction consists in so disposing the timber and plank in heavy solid masses as to expose the least number of corners or ignitible projections to fire, to the end also that when fire occurs it may be most readily reached by water from sprinklers or hose.

It consists in separating every floor from every other floor by incombustible stops, by automatic hatchways, by encasing stairways either in brick or other incombustible partitions, to the end that a fire shall be retarded in passing from floor to floor to the utmost that is consistent with the use of wood or any material in construction that is not absolutely fireproof; in guarding the ceilings over all specially hazardous stock or processes with plastering laid on wire lath, or upon dovetailed lath, following the lines of the ceiling and of the timbers without any interspaces between the plastering and the wood; or else in protecting ceilings over hazardous places with salamander, asbestos air cell board or sheet metal; in not only so constructing the mill, workshop or warehouse that fire shall pass as slowly as possible from one part of the building to another, but also in providing all suitable safeguards against fire; it consists in laying the top floor and an outer boarding of the roof over mortar, salamander or other heat retardent laid upon thick plank, where the maximum of safety is to be attained. Atkinson.

Cut Marks on Colored Goods

Can you give me a method for cut marks on black or colored goods? Wagram (676).

Most of our colored goods are prepared on what are called Yorkshire dressing frames, and the spinner when making the warps links a portion of the warp at each required cut length, in order that the warp dresser can mark the yarn, and when these link places come forward the weaver knows when the cut is finished. In black goods we invariably use white selvages, and the dresser always marks a portion of the selvage as well as the other yarn. Whenever we put any colored warps through the slasher we mark them red in the usual way, and before delivering them to the finisher we stamp them with the loom number, style and length. Colored goods are stamped red, and grey goods black. We use tar for the black with plenty of dryer, so that the mark soon dries and does not make any impression on any goods it may come in contact with. The stamping is placed about nine inches from the end of the piece to enable the finisher to stitch the pieces together without any interference with the stamping. If any question arises as to quality, length, etc., it can easily be traced. Slashing machines are fitted with a marking motion and when used will ensure a fairly uniform length of pieces, the only variation being caused by the various tensions in the loom. J. R. Greaves.

Wagram does not say whether he uses the short or long chain system of warping. If he uses the short chain, which is somewhat out of date, the only way to make a mark is to use a string the length required and tie the chain at that point; then when the yarn is dyed it will leave a white mark. All colored work that I have done has had just an ordinary cut mark made with a dauber on the slasher; on black warps it is usually a red mark. I have found that any dye that is in contrast to the ground work will be suitable for a cut mark. An overseer of weaving in one of our large mills tells me that in all their colored work they use a white selvage and usually put the cut mark there, in which case any color would do. He also said that he never had any trouble from unequal lengths except when the slasher tender had let the cut marker run dry or where it was not working right. Dan Ready.

Paste for Cotton Piece Goods

I would like a paste for piece goods that will stand mangling. Spring (971).

The following recipe is for a paste that will stand the strain of mangling for five or six hours:

2 gal. wash flour.
1 lb. farina.

Bring almost to a boil while stirring the mixture. Do not let it boil or it will become too thick. Paste the cloth together before putting it on a hot plate, then smooth it out until quite dry. This paste, if properly made, will stand more strain than the cloth itself will stand. It will not stand the boiling or bleaching process.

Montrose.

Baling Sea Island Cotton

I notice that while you have published a good deal on the subject of baling American, Egyptian, and Indian cotton, you have said nothing about the baling of Sea Island cotton. I would like to have some information on this subject. Excelsior (818).

A large user of Sea Island cotton writes us in reply to this inquiry as follows:—

"Cotton grown on the islands off the Carolina coast reaches us in uncompressed bags averaging about 8 feet long by 8 feet, 6 inches in circumference and weighing 335 pounds each. Cotton grown in Georgia and Florida from Island seed is put up in partly compressed bales 6 feet by 2 feet, 4 inches, by 4 feet, weighing 380 pounds each. In either case no bands are used, but the quality of the bagging is such that the bales arrive in good condition and suffer very little damage in transit." Andover.

Other large consumers of Sea Island cotton write us as follows:—

"Sea Island cotton is not baled like ordinary cotton because of the value of the staple and the importance of it not being injured in any way. Its nature is such that it is more easily damaged than peeler cotton. It is not compressed in any way, but simply put in large bags, which are then sewn up. These bags are made of very closely woven coarse burlap and are very strong, consequently the cotton does not accumulate dirt or other injurious matter; it being impossible to break open the bags by ordinarily careful handling.

"The sizes of the bags vary somewhat. The average height is about 5 feet, 6 inches, the width about 3 feet, 3 inches, and the thickness from 2 feet to 2 feet, 3 inches. The average weight of these bags is about 400 pounds, which gives a density of about 10 pounds per cubic foot." Arthur Dyson.

"The average weight of the Georgia and Florida Sea Island bales is 369 pounds; size, 30.03 cubic feet. Carolina cotton, 357 pounds and 37.32 cubic feet. Generally speaking the former is received in good condition; the latter in excellent condition." Seaboard.

The following letter from one of the leading dealers in Sea Island cotton in the South gives some valuable information regarding the baling of this grade of cotton:—

"In South Carolina the original method of packing Sea Island cotton still prevails; viz., take 12 feet of 50-inch, 2-lb. jute bagging, fold the two ends and sew the edges together very securely, thus forming a bag about six feet long. Suspend this bag with the mouth distended by a wooden hoop. The cotton is then thrown in and tramped down by the feet of a laborer, who also uses a wooden or metal pestle to ram the cotton down around the sides. When filled, sew up the mouth of the bag. The bags usually weigh 330 to 370 pounds.

"In Florida and Georgia Sea Island cotton is packed in plantation cotton presses in same way as Upland cotton, but the bales usually weigh 380 to 420 pounds, instead of 500 pounds and upward, as in the case with Upland cotton, and no ties (bands) are put on a bale unless, and until, it is recompressed in city presses for shipment abroad. Instead of bands the edges of the bagging are securely sewed."

W: W. Gordon & Co.

Press Roll on Pickers

What advantages are there in using a press roll on cotton pickers? This roll lies on the back lap in front of the calender rolls.

Putnam (1023).

The press roll on cotton pickers is employed as an additional calender roll, to assist in expelling the air from the sheet of cotton before it is rolled onto the lap. The roll is not driven by means of direct gearing, but simply by frictional contact with the cotton and the calender rolls.

Bolster.

The press roll is a hollow iron roll resting on the back calender or fluted roll, often called the lap roll. On the Kitson machine it is carried on two pins bolted to the sides of the machine so as to allow free movement. It is kept at all times in contact with the lap roll. The strip of cotton as it leaves the last pair of calender rolls, passes directly under the press roll and is carried forward to the lap by the action of the two rolls, that is the press and lap rolls. The purposes are two-fold:—

First.—It lessens the tendency of the lap to wrap around the calender roll while the machine is starting up and running, as it comes in contact with the lap just as it is leaving the calender rolls and just before it is wound into the lap.

Second.—It breaks the lap when the knock-off occurs and starts the lap when the machine is again started. When the knock-off operates, the lap rolls continue to revolve while the calender rolls stop. The press roll, resting on the lap and pinching it between itself and the back lap roll, continues to revolve from contact with the lap roll and thus breaks the lap into a straight edge at this point. When the lap is removed and the machine again started the press roll immediately receives the end of the lap when broken off and together with the aid of the lap roll passes it up over the back lap roll and down to the lap rod where it is wound into the form of a lap. Steuben.

A Small Spinning Mill

Do you think it would be advisable to start a mill to spin about 1,000 pounds of cotton yarn a week? We would not need a bleacher or dyer. Can you give some idea of how much floor space and what kind of machinery would be required? Warner (1050).

A spinning mill for 1,000 pounds of yarn per week would not be advisable as the production is too small for profitable operation, because of the high cost of equipping and operating such a plant. It is possible, however, for this amount of yarn to be spun and twisted, i. e., the cotton may be purchased in the roving and a small equipment of spinning and twisting machinery could be installed to convert it into 2-ply yarn. Even this method would not be advisable in the case of warp yarn to be sized, as the necessary machinery would be able to turn out a much larger amount. Bolster.

Blanket on Slasher Roll

I would like some information regarding the squeeze rolls on the slasher. We are running 72 by 68 40-inch goods. We use the very best blanket. Our trouble is the blanket slipping from the cotton cloth on the roll that should hold it straight across at the end.

Chopper (482).

The roll should be stripped bare and if rusty or covered with scales it should be sent to the shop and turned down smooth. Give the roll a coat of white lead and while this is still moist put on a piece of cotton cloth 1½ yards long. Be sure that the cloth is straight. Let the roll stand over night to dry and harden. Place the roll in the slasher and put on the first blanket which should be a coarse fabric three yards long, and be soaked from ten minutes to half an hour and applied wet. It should be overlapped by the cotton cloth at least one turn; one and a half would be better. It may be necessary to trim the edges so they will be perfectly straight with the roll.

After this put on two fine blankets each three yards long. Follow the directions given for the first one in regard to the laps and wetting and trimming. Do not think that one blanket five yards long will do in place of the two 3-yard blankets. As the outside fine blanket wears off it is trimmed down until used up. When putting on a new one of three yards the inner fine blanket is removed and the new one put in its place, the older one being put outside. In this way the coarse blanket will not need to be changed more than once a year.

These directions refer to the finishing roll. The other roll does not need a fine blanket. First put on the cloth, then two coarse blankets and finish with 1½ yards of fine cotton cloth. This method saves the blankets. If they are properly lapped they will not slip.

Thomas Barr.

Numbering Braided Banding

How is braided banding numbered and how can the number of any one piece of banding be determined? Braid (604).

Braided banding is made with sixteen strands. Single No. 10 cotton yarn is taken as a standard and the number of the banding changes with the change in the number of threads in each strand. Two strands of 20s cotton yarn may be used in place of each strand of 10s, but in both cases the number of the banding is the same. The following table gives the numbers of the banding and the yarn used in each of the sixteen strands:—

No. of banding.	Each strand.
30	2-10 or 4-20
48	3-10 or 6-20
64	4-10 or 8-20
80	5-10 or 10-20
96	6-10 or 12-20
112	7-10 or 14-20
128	8-10 or 16-20

Intermediate sizes are made by adding one thread of 20s; thus, No. 40 banding is made with 5-20 in each of the sixteen strands of which the braid is composed.

Cost of Shipping Textile Machinery

I should like some information regarding the cost of shipping cotton mill machinery from New England to Southern points. Is the rate the same from different New England points and does it make any difference whether a lot of machinery is shipped from one place or comes from different points? Warner (1078).

Stuart W. Cramer of Charlotte, N. C., who is agent for many textile machinery builders in the North and who is constantly making shipments to Southern mills, has compiled comprehensive data on this subject which answers the above inquiry as follows:—

For the general information of Southern buyers it is perhaps well to mention that cotton mill machinery takes the same rates from practically all New England points. The classification is 6th Class Specific, and applies to cotton mill machinery peculiar to cotton mills also to roving cans; in straight or mixed car loads released; minimum car load 20,000 pounds; does not apply on electrical machinery, engines, boilers, blowers, shafting or pulleys. For estimating purposes the rate can generally be taken at fifty cents per hundred pounds. Also it makes very little difference whether an order comes from one single shop, or is split up and comes from two or three different shops, for it will almost always happen that there will be at least one car load from each one of the different points, and anything over but still less than a car load can be billed with the full car at the same rate. Occasionally small shipments can be made to the machine shops and reshipped with the machinery to advantage; this practice is peculiarly the case in regard to roving cans,—at the same time, I question whether it pays, because the cans are often damaged in transit by being bruised or mashed out of round, too little to make a claim on the railroad for damages and yet enough to render their use more or less undesirable.

It is manifestly impracticable to attempt to give a schedule of the weight of different kinds of cotton mill machinery, as there are differences in weights peculiar to each builder, not to mention difference in weight according to specifications by the same builder. At the same time, as our customers have often asked for information as to the number of machines of each kind constituting a carload, I herewith append an approximate schedule as follows:—

Picking Machinery.—Generally three one-beater finishers, or three machines of like size.

Cards.—Four 40 or 45-inch revolving top flat cards.

Sliver Lap Machines, Ribbon Lap Machines, Combers.—Four 6-head combers, two sliver lap and two ribbon lap machines; or, ribbon lap machine in place of 6-head comber; all set up. Four 8-head combers, boxed, make a car load; cannot ship them set up.

Drawing.—Four 6-delivery heads, crated.

Slubbers, Intermediates, Roving and Jack Frames.—Four frames are usually considered a car load, but if they are not too long, five can be squeezed into a large car; in the case of six, however, the shipment would be divided into two cars, as three machines will exceed the minimum car load rate.

Spinning, Twisters and Spoolers.—Six frames of average length constitute a car load.

Reels.—Fifteen to twenty, knocked down and boxed.

Cone Winders.—Two machines of 100 spindles each, shipped in sections; the weight will be only 14,000 or 15,000 pounds, but it will pay to ship at minimum car load rate of 20,000 pounds.

Slashers.—One standard slasher is usually shipped as a car load and must be placed on a flat car; sometimes in a shipment of say five slashers the ten cylinders can be placed on two flat cars and the rest of the machinery in two box cars, thereby saving one car. The actual weight per machine is only 12,000 to 15,000 pounds, but it pays to bill it as a car load.

Warpers.—Eight complete slasher warpers with creels; or six complete slasher warpers with creels and fifty beams; or twelve slasher warpers without creels; or six leese warpers complete with creels and ballers; or eight leese warpers including ballers without creels; or twenty beamers complete with tension ends.

Quillers.—Four quillers set up; six or more boxed.

Looms.—Twenty plain pattern heavy 40-inch looms; other sizes in proportion.

Cloth Room Machinery.—Roughly speaking, two sets of cloth room machinery of average size for 40-inch goods constitute a car load, viz: Two sewing machines, two brushers with calender rolling machines, two folders, and two inspecting machines.

Presses.—These are strictly matters of weight, as they are relatively very small and compact. It will generally pay to have a first class press billed as a car load, whether it weighs 20,000 pounds or not. The small and lighter machines, however, can best be shipped at actual weight, less than car loads.

Nappers.—Two or three nappers.

Claims After Cutting Up

Some time ago we sold some white canvas to a customer who made it up into shoes. He now claims that the goods were not up to the proper standard and puts in a claim for the value of the made-up goods. We refuse to allow this claim as we contend that he should have made the complaint before the goods were cut up, in which case we would have made him an allowance if we found he was justified in regard to his claim.

What is the rule in the textile trade regarding claims of this kind? As far as our experience goes we find that no commission houses will make an allowance after goods are cut up, unless possibly to hold a customer.

Dalton (876).

We believe there is no established rule in the trade regarding whether claims shall be made before cutting up the goods or not. The American Woolen Company are trying to enforce the rule that claims shall be made before the goods are cut. We understand that one of the main purposes of the American Association of Woolen and Worsted Manufacturers is to establish some rule in this respect. In the absence of any fixed rule of this kind in the trade the practice depends in great measure on the condition of business. If business is good, manufacturers and commission merchants are in a much better position to insist on claims being made before cutting up; in times of bad trade, however, it is the buyer who has the whip hand and he can bring the manufacturers and selling agents to his terms.

Organization Sheets for Cotton Mills

I would like a working program of drafts, weights, speeds, and production for a cotton mill on 60s yarn, also some consideration of the subject that I may know how the results given in the program are decided. Southern (1623).

In estimating an organization sheet or working program of drafts, weights, speeds, production, and number of machines for a cotton mill, several important points have to be dealt with.

In planning for a new mill the question of capacity and number of machines is not very difficult, but in planning for an old mill, the most desirable combination of drafts, doublings and speeds have sometimes to be abandoned and a less satisfactory arrangement resorted to in order to increase the production of some one class of machines and, by so doing, increase the total production.

There is considerable range to drafts, weights and speeds on all classes of mill machinery and there are probably no two mills on the same class of goods that have indentically the same program all through the different processes.

Aside from the capacity and proportions of the machines available, the most important considerations are the numbers and qualities of the yarns made and the uses to which they are to be put. The finest numbers of yarn and the better qualities of hosiery yarns demand a long combed stock and a large number of doublings. Coarse yarns for weaving do not require such stock and the number of doublings is decreased. All yarns for knitting,. where a good quality is desired, should be spun from combed stock using the mule, with double roving and slack twist, as this tends to greater evenness and regularity.

There is a very great diversity of opinion in regard to the use of single roving. Many mills on print cloth, using 28s warp and 32s filling, spin both from single roving; some spin both from double roving, and others use double roving on warp, on account of the added strength, and single roving on filling. If evenness is desired in coarse yarns, double roving is often used and also in some cases to save making roving of a different size. As filling does not require so much strength as warp, it is often spun from single roving and the warp, of about same size or coarser, is spun from double roving.

In spinning 20s and under the intermediate roving frame is often thrown out and longer drafts used, while for finer yarns, say 60s and over, a fourth roving frame is used.

It is always desirable to have as few sizes of roving as possible in making yarns of different numbers, and it often happens in mills making a range of numbers, that longer and shorter drafts than are customary are used. The amount of draft at the various machines also depends upon the stock being used. Long staple cotton will admit of more drafts than short staple cotton, and as a rule the draft increases as the bulk decreases. In figuring a program where there are no severe limitations, average drafts in each case would be assumed, varying these slightly to bring the roving to standard sizes, remembering that, within reasonable limits, the heavier the sliver and the rovings and the longer the drafts, the smaller the amount of machinery necessary to produce the required amount of roving.

It is not possible to follow a program of weights and numbers exactly, but where any degree of care and accuracy is taken in working it out, the actual results obtained will not vary greatly from the figured program.

Following is given a program for 60s yarn, using four processes of fly frames without combers.

The drafts are all easy and this should give excellent results in actual practice.

PROGRAM FOR 60s YARN

Four processes of fly frames. No combers. 120 yds. 60s yarn weigh 16.66 grains.

Allowing a contraction in length of yarn of 3% due to twisting: then

16.66÷1.03=16.17 grains as weight of yarn as it leaves the rolls of the spinning frame.

Spinning frame draft 10.3. Double 2.

$\frac{16.17\times10.30}{2}=83.3$ grains, wt. of 120 yds. jack roving.

83.3÷10=8.33 grains, weight 12 yds. jack roving=12 hank roving.

Jack frame draft 6.82. Double 2.

$\frac{8.33\times6.82}{2}=28.40$ grains, wt. 12 yards fine roving=3.5 hank roving.

Fine frame draft 5.83. Double 2.

$\frac{28.40\times5.83}{2}=$ 82.78 grains, weight 12 yds. intermediate roving=1.20 hank roving.

Intermediate frame draft 4.8. Double 2.

$\frac{82.78\times4.8}{2}=199$ grains, weight 12 yds. slubber roving=.5 hank roving.

Slubber draft 3.6. No doubling.

$\frac{199\times3.6}{12}=59.7$ or 60 grains per yd., weight of drawing sliver.

Drawing frames draw six and double six at each process, giving a card sliver of 60 grains per yard.

Draft of card 97. Allow 5% for waste.

$$\frac{60 \times 97}{.95 \times 437.5} = 14 \text{ oz. lap from finisher picker.}$$

Having worked out a suitable program of weights and drafts, the next step is to estimate the production required at each stage of the operation. In getting these figures we must allow a certain percentage at the different machines for waste and stoppages. It would be impossible to produce the same number of pounds of yarn as there were pounds of card sliver, as every frame the material passes through makes some waste, due to breakages, etc., hence it is imperative to start with more pounds of cotton than the required number of pounds of yarn. After this allowance in the production is made there should be a certain allowance at each process for loss of time while doffing, oiling, etc. These amounts vary with different machines and also with the same machine on different classes of work. It is not possible to make a fixed allowance for each operation, but a fair average can be estimated from actual results. After this average allowance has been provided for, any discrepancy in production can easily be overcome by raising or lowering the speeds where needed.

It is not the best policy to use extra large machines in spinning and roving or very small ones. In the former case the loss of time while doffing, etc., is increased, and in the latter the cost of production is increased. It is not well to use excessive speeds anywhere, as by so doing the quality of the product is impaired and the percentage of breakages increased, thus increasing the time lost and the percentage of waste made.

In getting the figures which follow I have endeavored to strike a good average all the way through, without excessive speed or production, which will give a good, smooth, strong yarn at the spinning with the minimum of stoppages and waste.

We will assume that we want a production of 25,000 lbs. of 60s yarn at the spinning frames and, using the table of drafts and weights previously worked out, will find the number and capacity of the frames at each process, making sufficient allowance for waste and stoppages:

SPINNING FRAME

Production required, 25,000 lbs. of 60s yarn per week.

Speed of spindles, 10,000 r. p. m. Time run, 58 hours. Allow 5% for loss of time and waste.

$\sqrt{60}=7.74$; $7.74\times4.5=34.83$ turns of twist per inch.

$\frac{10{,}000 \times 60 \times 58 \times .95}{34.83 \times 36 \times 840 \times 60}$—.539 lbs. per spindle per week.

25,000÷.539=46,382 spindles required.

Spinning frames, 204 spindles each; then

46,382÷204=223 spinning frames.

This leaves a shortage of 10 spindles in the total number, but it is too small to be taken into account.

Note that in this calculation 4.5 has been used as a twist multiplier instead of the standard 4.75, as experiments made by the writer tend to show that this used as a multiplier, all other conditions being the same, will give a stronger yarn. It is common to use 4.75 as the multiple for twist and this change would affect the production but slightly.

JACK FRAME

The waste between the jack roving and yarn will probably not run much over 1 per cent. and the time allowed for stoppages for doffing, oiling, etc., will not be much over 6 per cent., so in order to get a production of roving sufficient to keep the spindles running we must make these allowances and figure for correspondingly heavier production.

Production of spindles 25,000 lbs. of yarn; then,

25,000×1.01=25,250 lbs. produced by jack frame.

Speed of flyer, 1,500 r. p. m. Hank roving 12. Size of bobbin 5×2½.

Twist per inch, $\sqrt{12} \times 1.2 = 4.15$ turns per inch.

Allowing the 6 per cent. loss of time due to stoppages on the jack frames, the following calculation gives the production in pounds per spindle per week of 58 hours:—

$$\frac{1{,}500 \times 60 \times 58 \times .94}{4\ 15 \times 36 \times 840 \times 12} = 3.25 \text{ lbs. per spindle.}$$

$25{,}250 \div 3.25 = 7{,}769$ jack spindles.

Dividing this into frames of 176 spindles each will give 44 frames, with 25 spindles short; this small number can be disregarded.

FINE FLY FRAME

Spindle production, 25,000 lbs. Allow 2 per cent. for waste between fine roving and yarn; then

$25{,}000 \times 1.02 = 25{,}500$ lbs. per week of fine roving.

Speed of flyer, 1,200 r. p. m. Size of bobbin, $7 \times 3\frac{1}{2}$. Hank roving, 3.5.

Twist $= \sqrt{3.5} \times 1.2 = 2.24$ turns per inch.

Loss of time while doffing, etc., 10 per cent.

$$\frac{1{,}200 \times 60 \times 58 \times .90}{2.24 \times 36 \times 840 \times 3.5} = 14.2 \text{ lbs. per week per spindle.}$$

$25{,}500 \div 14.2 = 1{,}796$ spindles.

Twelve frames of 152 spindles each will give only 28 spindles more than the calculated number and this is not large enough to be taken into account.

INTERMEDIATE FLY FRAME

Spindles produce 25,000 lbs. Allow 4 per cent. for waste between intermediate roving and yarn; then

25,000 × 1.04 = 26,000 lbs. required of intermediate spindles.

Speed of flyer, 950 r. p. m. Size of bobbin, 9 × 4½. Hank roving, 1.20.

Twist $= \sqrt{1.20} \times 1.1 = 1.22$ turns per inch.

Loss of time, 15 per cent.

$$\frac{950 \times 60 \times 58 \times .85}{1.22 \times 36 \times 840 \times 1.20} = 63.4 \text{ lbs. per spindle per week.}$$

26,000 ÷ 63.4 = 400 spindles.

Four frames of 102 spindles each = 408 spindles.

SLUBBER

Spindle production, 25,000 lbs. Allow 8 per cent. for waste between slubber roving and yarn; then,

25,000 × 1.08 = 27,000 lbs. required of slubbers.

Speed of flyer, 650 r. p. m. Size of bobbin, 12 × 6. Hank roving, .5.

Twist $= \sqrt{.5} = .7$ turns per inch.

Loss of time due to doffing, etc., 25 per cent.

$$\frac{650 \times 60 \times 58 \times .75}{.7 \times 36 \times 840 \times .5} = 160 \text{ lbs. per spindle per week.}$$

27,000 ÷ 160 = 181 spindles.

Three frames of 60 spindles each = 180 spindles.

DRAWING FRAMES

Spindles produce 25,000 lbs. Allow 12 per cent. for waste; then,

$25{,}000\times1.12=28{,}000$ lbs. required on draw frames.

Three processes drawing.

Front roll speed, 350 r. p. m. using metallic rolls, 32 pitch, 1 3-8 inches in diameter. Weight of sliver, 60 grains per yard.

$1.375\times3.1416=4.32$ circumference of front roll if using leather rolls, but with metallic rolls, the circumference must be 33 per cent. more on account of the crimping action of the flutes in metallic rolls; then

$4.32\times1.33=5.75$ inches delivered by each revolution of metallic rolls.

$$\frac{5.75\times350\times60\times60\times58\times85}{36\times7{,}000}=\text{1,416 lbs. per delivery per week.}$$

$28{,}000\div1{,}416=19.4$ deliveries.

Five frames of 4 deliveries each for each process.

CARDS

Spindle production, 25,000 lbs. Allowing 12 per cent. for waste, the cards will have to make 28,000 lbs. per week.

Loss of time, 10 per cent. Weight of sliver, 60 grains. Diameter of doffer, 27.75 inches outside clothing. Doffer speed, 10 r. p. m.

$$\frac{27.75 \times 3.1416 \times 10 \times 60 \times 58 \times 60 \times .90}{36 \times 7{,}000} =$$

650 lbs. per week per card.

$28{,}000 \div 650 = 43$ cards.

PICKERS

Spindle production, 25,000 lbs. Allowing 18 per cent. for waste, the pickers will have to make 29,500 lbs. per week.

9-inch lap roll running 8 r. p. m.; 14-oz. lap. Loss of time, 20 per cent.

$$\frac{9 \times 3.1416 \times 8 \times 60 \times 58 \times 14 \times .80}{36 \times 16} = 15{,}306$$

$29{,}500 \div 15{,}306 = 2$ finisher pickers.

It will be noticed that in getting the twist for the slubbers and intermediates the standard multiple of 1.2 was not used, but a lower twist put in. This was because the use of longer staple cottons necessitates a reduction in the amount of twist put in the roving so the following frames will draw the roving easily. The twist multiple of 1.2 is based on general usage with short cotton and will hold good in most cases, but as 60s yarn requires a staple of about 1¼ inches it is not necessary to run so much twist in the roving. The longer the staple of the cotton used the less the amount of twist. This reduction of twist will tend to increase the production on those frames.

In attempting to run the foregoing program with the equipment worked out, there will, in all probability, be some discrepancies that will cause a little trouble, but none that cannot be overcome by readjusting some of the speeds, etc. There should be a certain amount of elasticity in every program, as the loss of time varies with the efficiency of the operatives and the quality of work done, as well as the speed used; the production likewise varies from the same causes. Reducing the speed of fly frames will often increase the production from the fact that there will be a less amount of lost time due to breakage of the roving, etc. I have had this experience several times while running coarse work.

In many cases higher and lower speeds than those given are used with good results; greater and less productions obtained, more and less time lost by stoppages, etc., but the allowances made and the results obtained as given here are such as can be equalled and in many cases exceeded, by any well-organized and well-managed mill. B. M. Parker

---

Soft Twine and Cable Cord Harness

Which will last the longer, a soft twine or a cable cord harness? Chatham (681).

A soft twine harness should last from three to six years on high speed, but of course a few may break during that time, say from three to ten per cent. A cable cord harness will last from eight to ten years on high speed, say, from 150 to 200 picks per minute.

Henry Owen.

Flooring in Slasher Rooms

We have been troubled by rotting of the floor under our slashers and would like to know how this difficulty can best be remedied.

Slasher (1057).

Slashers are usually located on the upper floors of a mill, almost never on the ground floor. The usual custom is to provide drip pans under the machine which are most always of zinc.

The practice of covering the floor with sheets of copper soldered together is a very poor one. The floor will rot more quickly under those conditions than if there was no covering at all. Any moisture, as you know, tends to collect and to be held on the under side of the metal. Condensation of the steam not only from the slasher room, but from the room below would keep the floor beneath the copper constantly damp.

Concrete or asphalt might be a good thing if it was properly reinforced so it would not crack. Asphalt alone would not carry any weight if it is subjected to much heat. The objection to using asphalt or concrete in such cases is that the machines are likely to be moved in the event of rearrangement and the average manufacturer would not care to have a special kind of floor built under his slashers. Good solid spruce flooring with several layers of paper underneath to waterproof it and the planking treated with carbolineum would doubtless be of much better service than sheets of copper.

Some mills kyanize the lumber for such purposes, which has the same general effect. Spruce would seem to be the best material because it soaks up the impregnating compound better than other kinds of lumber. The use of wood blocks would have the same objections that apply to concrete and asphalt, namely that it would mean a different sort of flooring for certain parts of the mill. Engineer.

Density of Textile Materials

I would like to have some information regarding the density, that is, the pounds per cubic foot of textile materials in different forms, such for example, as cotton in the bale and in tightly woven cloth. I would also like to know the specific gravity of the fiber itself.

Fiber (1017).

The density of cotton in its various forms, especially when baled, is governed wholly by the kind of bale and how baled. The following figures will give a fairly comprehensive idea of the range taken, and also how valueless any given density is, unless the character of the bale is indicated.

The common American bale — the style of "package" that has been the cause of so much controversy between the American shipper and the European buyer — averages 475 pounds, and occupies about 22 cubic feet, the "density" of which would be 21.6 pounds per cubic foot, or a "specific gravity" of 0.345 compared to water as 1.000. On a basis of 25 pounds per cu. ft., the specific gravity would be 0.400.

An Egyptian bale recently measured weighed 700 lbs. and occupied 15 cu. ft., the "density" of which was 46.6 lbs. per cu. ft. and the specific gravity 0.745.

A bale from Pernambuco compressed to 400 lbs. per 10 cu. ft. has a density of 40 lbs. per cu. ft. and a specific gravity of 0.64. Another bale examined from Colombia, South America, weighed 550 lbs. to a volume of 26 cu. ft., having a density of 21 lbs. per cu. ft., and corresponding to a specific gravity of 0.336. The American round bale has an average density of 35 pounds per cu. ft., and a specific gravity of 0.56.

The specific gravity of the various textile fibers are given in the following table:—

Cotton	1.50-1.55
Linen	1.50
Hemp	1.48
Jute	1.48
China Grass	1.51-1.52
Wool	1.28-1.33
Mohair	1.30

Raw Silk	1.30-1.40
Degummed Silk	1.25

The density of woven fabrics depends upon the weave, weight of yarn, etc., and can be ascertained only by making direct tests.

The density of wool can be calculated approximately from its specific gravity, using the various figures for cotton for comparison. A bale of Bagdad wool just measured gives a density of 42 lbs. per cu. ft., corresponding to a specific gravity of 0.672 (water=1.000).

Dumfries.

Rope Transmission in Textile Mills

Why are ropes for the transmission of power in the textile mills of the United States of America not so commonly used as in other industrial countries? Hiram (693).

Our correspondent makes an assumption that we hardly think is justified by the facts. His question will probably apply equally well to other manufacturing industries using large amounts of power. There is no definite data on the subject, but it is doubtful whether rope transmission is not in equally general use here as abroad. The extension of the use of the rope drive in this country within recent years has been very rapid and the conditions of only a few years ago have radically changed.

An authority on this subject, who was consulted, replies:—

"We believe it is true that the rope drive was introduced and developed in England and European countries before its general adoption in this country, so that in times past this means of transmission was used more freely abroad than in the United States. As to just how that condition happened to come about at the time we are hardly prepared to say. When power users began to adopt some system of band transmission in place of transmission by gears, which had been previously used for large drives, it appears that in this country leather belting was largely adopted and rapidly and carefully developed as a means of connection, while in England instead of adopting leather belting so widely, the rope drive came into favor.

"However, the advantages of the rope drive have now become very widely known and appreciated in this country and ropes have rapidly replaced belting in many places on the main drives of plants using a large amount of power. We might say that this condition is very noticeable among textile mills, and especially among the newly constructed mills of our southern states.

"We believe that although first used abroad the rope drive at the present time will be found in a more highly developed state in the United States than anywhere else in the world. The fact that American manufacturers have a large demand for their manila transmission rope in foreign countries has proven that so far as the construction of the transmission rope itself is concerned this country must be in the front rank."

Prices Paid for Winding Yarn

What is the price per hundred pounds that is paid for winding cotton yarn from cones on to bobbins, also price per hundred usually paid for winding worsted yarns from cops to bobbins?

Adams (1113).

For the following list of yarns these prices are generally paid:—

Cotton		Worsted	
1-7	$0.35	1-20	$1.00
1-8	.35	1-30	1.50
1-14	.45	1-40	1.75
1-16	.45	1-50	2.25
1-18	.50	1-52	2.25
1-20	.50	1-22	1.00
1-24	.60		
1-25	.60		
1-60	1.00		
2-28	.45		
2-30	.45		
2-40	.50		
2-50	.60		
2-60	.70		
2-80	.80		

I have not got the regulation figures at hand but I give you here the prices I am at present paying and do not believe that they will be found far out of the way for good winding. These prices could be lowered by giving a hand more ends to wind than he could take care of and give the best results. They might also be lowered where help is plentiful and labor cheap, but the prices would have to be very close to these in scale. I believe that any attempt to lower the worsted prices unless the yarn winds exceptionally well, would be more than offset at the knitters. Madison.

Marking Ink

Please tell me what ink to buy or how to make a black ink that will print on white cotton cloth and will not run if washed a little in cold water. Sandoval (632).

There are numerous inks on the market that the makers claim are absolutely fast to washing. Practical printers or dyers with long experience will each have a formula of his own, the principal ingredients probably being logwood and chrome, but these are being rapidly succeeded by dyes more fast to washing. A retired calico printer, a man who has spent nearly fifty years in the business, gives me the following formula for printing a very fast black on cotton cloth, mixing it in pigment style:—

	Parts
Venice turpentine	9
Soft potash soap	10

	Parts
Olein	4
Lamp black	6
Extract of indigo (neutral)	1
Water	1

He describes the method of mixing as follows: The turpentine is first heated, along with the olein. Then the soap is placed on a levigating slab, and the mixture of turpentine and olein is gradually incorporated into it. When this is completed, the lamp black, which must first be ground as fine as possible and sifted, is worked in. The extract of indigo and the water are then added and the ink is ready for use.

For an aniline mixture, the following process gives a fine ink, and it is one that is extensively used for marking purposes in bleacheries, being one of the fastest blacks known:—

	Part
Aniline salts	1
Sodium chlorate	1
Ferrocyanide of potassium	1
Water	1

A little starch thickening is added to suit. The color is developed wth heat or age, thus taking a longer time to prepare than the first formula given, but if time is no object the aniline mixture is preferable.

Some people are satisfied with an ordinary coal tar ink obtained by reducing the tar with any ordinary solvent, turpentine being most generally used, but this is not as fast as either of the two formulas given. William Eddy.

Weight per Square Yard

Please publish in your Question and Answer Department a solution of the following textile problem:—

Ex. A cotton fabric has 74 ends of 20s warp and 66 picks of 20s filling per inch. Find weight per square yard, allowing for take-up 13 per cent. in warp and 12 per cent. in filling.

I would also like to have an explanation of the method of allowing for take-up of warp and filling. Otto Wood (737).

The allowance for take-up in warp and filling is made by percentage on the spun length of the yarn taken as a basis. This spun length is the length on the warp beam for warp, and that on the bobbin for filling. If the warp take-up is 13 per cent. then 100 yards of warp will make (100—13) 87 yards of cloth. If the filling take-up is 12 per cent. then 100 yards of filling yarn on the bobbin will measure (100—12) 88 yards in the cloth.

The yarn length is the basis of 100 per cent.

The take-up is expressed by the rate per cent.

The cloth length is the yield per cent.

The calculations of allowance for take-up are thus simple operations in percentage. The spun length is found as follows:—

Ex. What length of warp is required for a 50-yard cut with a warp take-up of 13 per cent?

50÷.87 (yield)=57½ yards of warp.

The weight of the fabric in the problem given by Otto Wood is calculated as follows:—

20s cotton=(20×5¼) 10½ runs.
74 (ends)×36 (in.)=2664.
2664÷.87 (yield)=3062 yds. of warp.
66 (picks)×36 (in.)=2376.
2376÷.88 (yield)=2700 yds. of filling.
3062 (yds.)÷1050 (yds. per oz.)=2.9 ozs. warp.
2700 (yds.)÷1050 (yds. per oz.)=2.6 ozs. filling.

Weight per square yard 5.5 ounces.

The mistake is sometimes made of taking the cloth length as the basis of 100 per cent. By this method a take-up of 13 per cent. means that 100 yards of cloth requires 113 yards of warp.

The first method by which the spun length is taken as a basis is to be preferred, because it corresponds to the usual method of making allowances for losses in other processes, by which the original length or weight is considered the basis. Thus an allowance of 15 per cent. for waste in carding and spinning means that 100 pounds of cotton at the picker yields 85 pounds of spun yarn. Likewise a take-up of 15 per cent. in weaving means that 100 yards of warp yields 85 yards of cloth.

Sticky Warps

Lately we have had a good deal of trouble with our warps sticking to the slasher cylinder. Can you tell us how to prevent this?

Cylinder (505).

As we do not know just what style of work Cylinder is running, we shall have to give some of the usual causes for warps sticking to the cylinder and leave him to decide whether any of them fit his case. The two principal causes are found in the size and the squeeze rolls. If the goods being run require a heavy size I should advise adding one pound of paraffine to every hundred gallons of water. To do this properly the wax shoud be shaved and mixed with half a pail of water by boiling, and then added to the kettle of size. Be sure that the size is thoroughly cooked before using. Properly cooked size will feel smooth, like good engine oil, when rubbed between the thumb and finger, and just the least bit sticky as it cools. If it is so thick that the thumb and finger stick together there is either too much starch for the quantity of water or it has not been boiled long enough.

If the size is all right, look next to the finishing squeeze roll. This should have at least 10 yards of blanket, as follows: 3½ yards of coarse blanket next to the iron roll, called No. 1; then 3½ yards fine blanket, No. 2; and then 3 yards of fine blanket that has been run three days or longer, No. 3. Never put a new blanket on the outside, but when No. 3 wears out take off No. 2 and put the new one in its place, and put No. 2 on the outside. This is necessary to make the yarn dry properly and not stick to the cylinder.

These are the most common causes for the trouble, but there are others that will produce it to a greater or less extent. Running the slasher too fast carries the size onto the cylinder and gums it so the yarn will stick. If there is too much cloth on the roll the yarn will break and the loose ends stick to the cylinder. After the trouble has been located it is necessary first to give the cylinder a good washing with soft soap and water. After wiping dry go over the cylinder with a piece of oily waste and then everything is ready to begin right.

Thomas Barr.

Mercerizing Single Yarns

Are single yarns ever mercerized?

Ashton (999).

Single yarns can be and are mercerized and while a very good gloss can be obtained, the best results are produced on two-ply yarn. The yarns should not be stretched while being immersed in the caustic soda solution, but stretched during the washing off immediately after leaving the mercerizing bath. Peterson.

Spooler Production

What is the usual production in spooling black skein yarn on a skein winder, counts ranging from 2-5s to 4-20s, and what is the price generally paid for such work?

Webber (855).

This is a rather hard question to answer as so many things must be taken into consideration. The amount of yarn one girl can spool depends on the speed of the spindles, the condition of the yarn as it comes from the dyer, the count of the yarn, the size of the skein, and the color. Black is a particularly hard color to handle, and the coarser the yarn the fewer the number of spindles she can run. Sometimes one girl can keep ten or twelve spindles running at once; other times only one or two, but if everything is in good working order she should be able to turn off a production of 780 to 900 pounds a week. Our skein winder does very well if she turns off 700 pounds of 2-16s a week. In this instance the cost is 1.2 cents a pound. or $8.40 a week.

Following is a rule I have worked out and if everything is running well it gives nearly the exact production for one girl:—

1.25 inches (diameter of bare spool) × 3.1416 = 3.927 inches, circumference of bare spool.

5 inches (diameter of full spool) × 3.1416 = 15.708 inches, circumference of full spool.

Total number of inches, 19.635.

$19.635 \div 2 = 9.817$ inches, average, wound at one turn of the spindle.

Suppose the spindle is running 800 r. p. m., there will be (800×9.817) inches 7,853.6 inches wound per minute.

Now we will take 2-20s yarn which is the same as No. 10, and we will assume that the skein weighs one-half pound. This will measure ($840 \times 10 \div 2$) 4,200 yards, or 151,200 inches.

151,200 (inches) $\div$ 7,853.6 (inches per minute) $=$ 19.25 minutes that the skein will run.

The girl will need about 1½ minutes to put the skein in order; $19.25 \div 1\frac{1}{2} = 12.8$, or 13 spindles to one girl.

The number of minutes in a week is (58 hours $\times 60$) 3,480; $3{,}480 \div 19.25 = 180$ half-pounds, or 90 pounds to a spindle; 90 pounds $\times$ 13 spindles $= 1{,}170$ pounds per week, with 10 per cent. allowance.

At this rate the production for the counts mentioned would be as follows:—

Yarn Count	Spindles per Girl	Production Lbs. Yarn	Less 10% Lbs.
2-5	3.3	1,148	1,033.2
2-8	5.1	1,152	1,037.3
2-14	9	1,152	1,036.8
2-20	13	1,170	1,053
2-30	19	1,178	1,060
3-12	5.1	1,152	1,037.3
3-26	10	1,160	1,044

Yarn Count	Spindles per Girl	Production Lbs. Yarn	Less 10% Lbs.
4-16	5.1	1,152	1,037.3
4-20	6.4	1,158	1,042.5

The price varies from 8 mills to 1 2-10 cents per pound.
Clayton.

Average Count of Yarn

How is the average count of yarn found in a spinning room on mixed numbers? At this time I am making 22s, 24s, 26s, and 30s; about 1,000 spindles on 22s, 1,000 on 24s, 1,600 on 26s, 8,000 on 30s. What is the average number?
Norwood (577).

The average count of yarn of different sizes is the average number of hanks per pound and this cannot be calculated from the spindles and counts. If the length of the yarn spun in a mill were in proportion to the number of spindles irrespective of the size of yarn, a rule could be given for calculating the average count from the different counts and the number of spindles on each, but this is never the case. The length spun depends on the speed of the rolls which varies widely with different counts, and in fact for the same count. Again, the production of the different sizes is affected by breakdowns, doffing and other things which are never uniform on all machines in a room. Owing to these varying factors the average count of a spinning mill's production varies constantly. The only way it can be calculated is from the different counts and the quantity of each (expressed either by length or weight) produced in any given time. The following example illustrates the method:—

Ex. A spinning mill produced 12,000 pounds of yarn in one day; 4,000 pounds 10s, 6,000 pounds 30s, 2,000 pounds 40s. Find average count for that day.

4,000 pounds 10s= 40,000 hanks
6,000 pounds 30s=180,000 hanks
2,000 pounds 40s= 80,000 hanks

12,000 pounds 300,000 hanks

300,000 (hanks)÷12,000 (pounds)=25, average count or hanks per pound.

If the product is given in hanks instead of pounds, the operation is as follows:—

40,000 hanks 10s=4,000 pounds
180,000 hanks 30s=6,000 pounds
80,000 hanks 40s=2,000 pounds

300,000 hanks 12,000 pounds

300,000 (hanks)÷12,000 (pounds)=25, average count or hanks per pound.

This method is correct for any fixed weight method of yarn numbering such as cotton, worsted, run or linen system.

Spinning Machinery and Power Required for 125 Looms

Kindly give me a list of cotton spinning machinery required to supply 125 looms for the manufacture of print goods, 28 inches wide, and the power required to run them.

Dunster (1041).

The following is a list of cotton spinning machinery required to supply 125 looms for the manufacture of print goods:—

	H. P.
1 breaker picker	7
1 intermediate lapper	7
1 finisher lapper	7
6 cards	1⅞
1 drawing, 1 head of 5 deliveries, 1st drawing	1
1 drawing, 1 head of 5 deliveries, 2d drawing	1
1 slubber, 52 or 56 spindles, 12 by 6	1¼
2 intermediates, 72 or 78 spindles	2¾
4 fine frames, 120 or 128 spindles	5½
12 spinning frames, 256 spindles, half warp, half filling	35
1 spooler, 100 spindles	½
2 warpers	½
1 slasher	1¾
125 looms	26
1 folder	⅛
1 shear and brush (if this is necessary)	3¼
1 waste picker	1½
Total	103

There is a combined breaker and finisher picker that would take the place of the breaker picker, intermediate and finisher so far as making the laps are concerned, and such machines are used in small mills on coarse goods. I am sure that such a machine would give you as clean cotton cloth both as to leaf and slugs. Probably an opener with a small blower system would overcome the difficulty. I intend some day to install such a system to open my cotton in better shape.

I should recommend the following machinery for a 125-loom mill:—

	H. P.
1 pale breaker with lattices for two mixings, 3 ft. by 6 ft. 2 in.	3
1 hopper feeder with opener and single beater lap machine combined, 36-inch lap, 27 ft. by 6 ft. 2 in.	12
1 finisher lap machine, double beater, to make 38-inch laps from 4 laps from single beater lap machine, 14 ft. by 6 ft. 2 in.	5
1 thread picker for extracting hard ends from the waste of ring frame roller laps, so that the waste can be used in the mixing for making the filling yarn, 4 ft.	½
8 revolving flat cards, 37 inches on wire, 50 cylinder, 26-inch doffer, 110 flats 1 3-8 broad; 10 ft. 6 in. by 5 ft. 6 in.	12

	H. P.
1 set drawing frames, 3 heads of 7 deliveries each; 35 ft. These may either be arranged one in front of the other or in a line	4½
1 slubbing frame, 66 spindles; 27 ft.	1½
2 intermediate frames, 88 spindles each; 27 ft. each	2
6 roving frames, 112 spindles each for 4½ hank roving; 27 ft. each, 2 h. p.	12
22 ring frames, 224 spindles each = 4,928 spinning spindles; 27 ft. each, 3 h. p.	66
1 winding frame, 200 spindles, 25 ft. long. This frame should be supplied with a traveling apron to carry the empty ring bobbins to the end of the frame	4
2 beaming frames for making back beams for the sizing machines; 25 ft.	1
1 sizing and taping machine (this really belongs to the weaving department)	6
Total	129½

It is calculated that 1 h. p. will be required for 40 ring spindles and the necessary preparation machinery, but from actual experience it is advisable to reckon 38.

A plant of these dimensions cannot be worked as economically as one of any four times the size, as the preparation equipment you are compelled to install is capable of supplying considerably more spindles, to the same initial outlay. A number of cotton mills at the present time are doing away with making mixings, and are using the cotton direct from the bales, but having had practical experience with both systems, I have no hesitation in recommending having mixings, as the exposure of the raw cotton to the atmosphere for say three or four days previous to using, allows it to open out naturally, which puts it in a more suitable condition for subsequent manipulation than what might be termed the artificial mode of treatment in feeding the cotton direct from the bale to the opener. Certainly a concern can be worked with less capital by not having mixings, as so much less cotton is required on hand, but the advantage of being enabled to make a more satisfactory yarn with less loss in waste, and less wear and tear on the preparation machinery, is considerably greater than the small amount of interest on capital that would be saved. There is nothing more detrimental to cotton machinery than badly opened cotton, as it puts a strain on certain points that should be avoided, and the faults of the preparation machinery are apparent to the practiced eye, in the yarn and cannot be remedied after leaving the lap machine. In fact, the proper manipulation of the cotton in its earlier process is the secret of success in cotton spinning, as it affects both quality and quantity of the yarn produced, and also the amount of waste made.

If there are any further particulars you desire respecting these machines, such as speed of spindles and front roller, length of lift, diameter of front roller, width and diameter of pulleys required on frames, twist per inch, grinding apparatus for cards, etc., I will be pleased to supply same. In ordering new machinery it is always advisable to have every little detail specified, in order to prevent additional expense on necessary items that have been omitted when making the contract. These "extras" should be avoided, or they will be found to foot up to a considerable amount. Denbigh.

Numbering Cotton Duck

How is the weight of cotton duck calculated from the number and width? I would like an explanation of the system of numbering cotton duck. Concord (710).

For numbering heavy sail duck a cloth weighing 18 ounces per running yard 22 inches wide is taken as a standard and called No. 1. For each ounce below 18 the number is increased by 1. Thus, No. 2 duck weighs 17 ounces per yard 22 inches wide; No. 3 duck, 16 ounces, and so on. Duck heavier than 18 ounces per yard is numbered by ciphers, a cipher being added for each ounce increase in the weight. Thus, 1-0 duck weighs 19 ounces per yard 22 inches wide; 2-0 duck weighs 20 ounces per yard 22 inches wide, and so on. Duck is made as heavy as 20-0, which should weigh 38 ounces per yard.

The width of 22 inches is the standard for numbered duck and the weight per running yard for other widths is in exact proportion to the width. Thus, 24-inch duck would weigh 1-11 more than the standard 22-inch goods, while 11-inch duck would weigh per running yard one half as much as the standard 22-inch goods. For example: No. 8 duck, which weighs 11 ounces per yard 22 inches wide, would weigh 12 ounces per yard 24 inches wide. Again 2-0 duck, which weighs 20 ounces per yard 22 inches wide, would weigh 10 ounces per yard 11 inches wide. The following table shows the special range of numbers and weights of 22 inch sail duck and will illustrate the system of numbering:—

2-0=20 ounces per yard 22 inches wide.
0=19 “ “ “ “
1=18 “ “ “ “
2=17 “ “ “ “
3=16 “ “ “ “
4=15 “ “ “ “
5=14 “ “ “ “
6=13 “ “ “ “
7=12 “ “ “ “
8=11 “ “ “ “
9=10 “ “ “ “
10= 9 “ “ “ “

Light cotton ducks are not numbered by this system. The weight of these light goods is indicated by the regular method used for woolen and worsted goods, that is, by the ounces per running yard regardless of the width. Thus, a 10-ounce duck 30 inches wide would be a slightly lighter fabric than a 10-ounce duck 28 inches wide by reason of the difference in width.

The weight and number of cotton duck, as well as the size of the yarn in it, can easily be determined from a small sample. A piece having an area of 1-300 square yards (1.8 by 2.4 inches) is cut and weighed. The number of grains in the weight of such a sample is equal to the weight in ounces per yard 52½ inches wide. The weight per yard of any other width is then calculated by proportion. The size of the yarn is found by dividing the threads per inch by the number of grains in the weight of the yarn in the sample. Thus:—

Ex. A sample of duck 1.8 inches by 2.4 inches weighs 23.9 grains. There are 40 ends of warp and 36 picks of filling per inch. Find number of duck and average count of yarn.

23.9 grains = 23.9 ounces per yard, 52½ inches wide.

(23.9 ozs. × 22 in.) ÷ 52½ inches = 10 ounces per yard 22 inches wide, or No. 9 duck.

76 (40 + 36) ÷ 23.9 = 3.2 average count of cotton yarn.

The count of the single yarn in warp and filling is found by raveling and weighing the warp and filling separately, then dividing the ends per inch by the weight in grains respectively, and allowing for the number of strands in the ply yarn.

Sizing of Warps for Lawns

Can you give me any information regarding the method of sizing warps for lawns and other sheer white goods? Laurence (812).

At no time is an understanding of the art of dressing so important as when handling and dressing warp yarns from 60s to 100s, especially for fancy white work and lawns. The yarn has to be not only sized carefully, but the utmost watchfulness is required that it may enter the weave room without streaks of any kind. Although the size is a most important factor it is only one of the many that tend to the production of a warp that will be a credit to the dresser.

A size made according to the following recipe will give a finished warp that will weave well and cause but very few seconds in the cloth room:—

To a kettle containing 100 gallons of water, add 85 pounds of good potato starch and 6 pounds of tallow (not grease). After this has come to a boil add one-half pound of paraffine wax previously shaved into two quarts of water and dissolve by heating. Allow the combined mixture to boil two and one-half hours and keep it hot until it is all used.

After the size is cooked, draw down a batch in the size box of the slasher, and to this first batch add one pail of water. To have this enter the yarn it is only necessary to keep it boiling while the yarn is passing through it. The steam will keep the size the right consistency without adding water to the other batches.

In order that the warps may be sized regularly and evenly, there should be some regular time to draw the fresh size. I consider the best time to be when on the last five or six cuts of the beam. Many slashers are piped to draw size in only one end of the size box, but it will be readily seen that the size will be more evenly distributed if a pipe enters each end of the box.

I prefer a geared cylinder slasher for all kinds of fine work and am able to turn out better work with this than with any other kind. Great care must be taken on all fine yarns not to stretch them while wet. There should be practically no tension on the yarn from the finishing size roll to the take-up, or calender roll. The yarn should be taut and straight as it enters the size. The immersion roll should be only one inch below the surface of the sizing solution, and both the size rolls should be covered with all wool blankets, the one on the outside of the finishing roll of a very light weight. The blankets on the finishing roll should be wound to a thickness of one and one-half inches; on the first roll to two inches.

One trouble in weaving fine yarns is that the elasticity has been taken out in the slasher and the ends will snap at every opening of the harness in the weave room. Many times the yarn is stuck together because the slasher man does not put in the tapes; the tapes should be put in every second beam on all fine yarns.

Thomas Barr.

Absorbent Cloth

We are manufacturing a pile-fabric of cotton. We use 2-20s and 3-24s grey cotton yarn. After weaving, the goods are bleached by the open process. We have no trouble in securing a perfectly white bleach, but it is very important that our goods be thoroughly and quickly absorbent when finished, and on this latter point we have been unable to secure uniform and satisfactory results.

We enclose a finished sample which we believe will absorb about as we wish to have the goods. It may be tested by dropping it, pile side down, on a dish of water; if it quickly absorbs the water and is saturated within 30 seconds (possibly 40) it is all right. We have not tested it as it is supposed to be right before it is finished.

In explanation of what may seem contradictory statements we wish to say that we have been, and are, able to make the goods absorbent. The trouble is that we frequently find it necessary to treat the cloth a second or even a third time after it comes from the bleach and has been dried, before it will absorb properly. These supplemental treatments are simply a plain water or caustic soda boiling and they will do the business. What we want to learn is how to be sure that the goods are absorbent before they are ready for finishing.

We have found it a very perplexing problem inasmuch as we will treat one lot in a certain manner and it will come out right; perhaps the next lot, treated in exactly the same manner (by this we mean that everything is tested and weighed, same time in boil, chemic and sour) will be about as absorbent as a cork and require the supplemental treatment.

We have made many inquiries and many persons have told us just how to do it, but practical results have proven their theories incorrect. Can you give us any information that will enable us to secure the results desired?

Lockhaven (817).

I have given a sample of the cloth referred to the test of which "Lockhaven" speaks, and find it as he says, about as absorbent as a piece of cork. It was on the water more than a minute and a half and was then no wetter than a duck's back. The cause is evident: not thoroughly bottomed, hence the buoyancy without absorption.

I do not understand how the pieces can vary so much if they are all treated alike; if one lot comes out right all the others should be the same. The cause of the trouble seems to be in the boiling. "Lockhaven" says all of them were boiled for the same length of time, but were they under the same steam pressure? Was there any possibility of extra condensation before the steam reached the cloth? Something is wrong with the boiling; that is evident. The chemic might be used a little stronger also.

If I knew whether the goods were bleached in a jig, as used in dyehouses, or in a patent open bleaching machine under pressure, whether they were put through a straight caustic bleach, or lime was used in the first boiling I could give a more definite answer. There is no reason why these goods could not be got right the first time; they are a good cloth and will stand a lot of bleaching.

"Lockhaven" also wants to know how to be sure the goods are absorbent before finishing. If the goods are in long lengths, cut out a small piece near a seam, after they have been put on the last sour bath; wash the piece well and dry it thoroughly. Then take a pen, dip it well in ink and throw a few spots on the cloth. If the ink spreads and dries immediately, as on a piece of blotting paper, the goods are all right; if not right, the ink will stay in one spot and be a long time in drying without spreading. This is a good test and very simple, or it could be tested as first mentioned, by dropping it pile side down on a dish of water. If the goods are in towel form with fringes they could be treated the same way.

The statement that the only supplemental treatment the goods require is a plain water boiling shows that they are under boiled.

Henry Douglas.

We have to thank you for the information in your April issue regarding the methods for making cotton goods more absorbent. We have been trying to follow some of the suggestions made by your correspondent and think we are securing better results.

Perhaps our statement that we used the open method of bleaching was not explicit enough, as one of your correspondents speaks of the uniformity of steam pressure under which goods are boiled. Our boiling kier is an open wood kier with vomit pipe connected with injector and designed to keep continuous circulation. After boiling actually begins the heat must be practically uniform, as the pressure of steam to the injector is regulated by a reducing valve permitting the steam to pass at about 15 lbs pressure and as our boiler is kept at 30 to 40 lbs. pressure there is a continuous and uniform flow of steam.

However, we believe there has been more or less irregularity in the heat of water delivered from the vomit pipe owing to a variation in atmospheric conditions, condensation, etc., which affected the water between the time of leaving the mouth of the pipe and its contact with the cloth. To obviate this we have immersed the mouth of the vomit pipe in the water and find that much less steam is required and that a more effective boil is secured besides giving a certain amount of agitation to the water, which seems to cause all parts of the cloth to become more thoroughly and perfectly saturated.

We deferred writing to you as we desired to make some experiments of the suggestions offered. We run about 1,000 lbs. to a bleach, but the nature of our goods is such that we are satisfied a much longer time is required in the boil than would be the case if the goods were plain; the pile mats down and makes a very heavy and compact mass that is difficult to boil in a uniform manner in an open kier.

Again thanking you for your courtesy and trouble, we are,

Very respectfully yours,
Lockhaven (817).

Setting for Cards

In the answer on "Setting for Cards" by W. S. on page 117 of your January issue the following statement is made: "If the flat stripping is too heavy the front plate should be set a little closer to the cylinder and away from the flats; if too light, set closer to the top flats."

I and doubtless many others would read with interest the reason why and how such a change in this particular setting will change the amount of flat strips; and, also what percentage of waste is usually taken out by the flats, and how much this can be varied by changing the position of the front plate. Interested (969).

In reply to "Interested" the change in the position of the front plate changes the draft or air current. This affects the amount of strips taken out by the top flats. It would be impossible to say just how much of a change can be made at this point. The strip may be changed from a very light one to a very heavy one.

To get the best results the plate should be kept well up between the cylinder and the top flats. If the plate is too low much good fiber will be taken out with the strips. With the plates properly adjusted the strips from the different flats should be held together by just a few fibers between them. The weight of the individual strips may be from 15 to 20 grains each.

The percentage of strips taken out will vary widely with the class of cotton and amount of sliver produced. The following table will give an idea of the percentages with strips of different weight and varying production per week, top flats running 3.5 inches per minute.:—

Production	15 gr. strip	18 gr. strip	20 gr strip
300 lbs.	3.8%	5.6%	6.2%
500 lbs.	2.9%	3.4%	3.8%
700 lbs.	2.0%	2.5%	2.7%
900 lbs.	1.6%	1.9%	2.1%

W. S.

INDEX

PAGE
Absorbent Cloth 79
Adding Repair Shop 9
Adjusting Claims 41
Advantages of Mixings 73
Advantages of Press Roll 33
Allowance for Stoppage 47, 49, 50
Analysis of Cotton Check 22
Asphalt Floor in Slasher Room 54
Average Count of Yarn 68
Baling Sea Island Cotton 30
Blanket on Slasher Roll 35, 65
Bleaching Cloth 81
Braided Banding, Numbering of 36
Breaking Strength of Yarn 13
Cable Cord Harness 53
Calculating Average Count 68
Calculating Production 17
Calculating Weight of Cloth 62
Calculation of Allowance for Take-up 63
Carding Dyed Cotton 7
Cards, Production of 51
Cards, Settings for 83
Causes of Warps Sticking to Cylinder 64
Caveat 14
Check, English Cotton 22
China Grass, Specific Gravity of 56
Claims After Cutting Up 41
Cloth for Rolls 12
Colored Cotton, Dressing for 6
Colored Goods, Cut Marks on 28
Combined Breaker and Picker 71
Combing Cotton 7
Concrete Floor for Slasher 54
Construction of Mill Buildings 27
Construction of Repair Shop 9
Core in Ply Yarn 23
Cost of Machinery for Cotton Warp Spinning Plant 16
Cost of Shipping Textile Machinery 37
Cost of Starting Up a New Mill 5
Cost of Winding Yarn 59
Cotton Bales 56
Cotton for Combing 8
Cotton, Specific Gravity of 56
Cut Marks on Colored Goods 28

PAGE
Density of Baled Cotton 32
Density of Textile Materials 55
Determining Number of Braided Banding 36
Double Roving 43
"Double Spun" Cotton 18
Drafts, Weights, Speeds and Production 42
Drawing Frames, Production of 51
Dressing for Dyed Cotton 6
Duck, Numbering 74
Effect of Sizing on Cotton Yarns 19
Efficiency of Preparatory Machines 17
Electricity in Cotton 7
English Cotton Checks 22
Equipping a Cotton Warp Spinning Plant 14
Equipment for Repair Shop 10
Estimating Production 46
Example for Finding Average Count 69
Example for Finding Number of Duck 76
Feel of Cloth 20
Finding Average Count 68
Fine Fly Frame, Production of 49
Fine Yarns, Sizing and Warping 78
Flooring in Slasher Rooms 54
Harness, Loom 53
Heavy Sizing on Yarns 19
Help in Repair Department 11
Hemp, Specific Gravity of 56
Hollow Space in Ply Yarn 23
Importance of Analysis 23
Increase in Length in Mercerizing 12
Ink for Marking 60
Intermediate Fly Frame, Production of 50
Inventions, Protecting 13
Jack Frame, Production of 48
Jute, Specific Gravity of 56
Lawns, Sizing Warps for 77
Linen, Specific Gravity of 56
Location of Repair Shop 9
Loom Harness, Wearing Qualities of 53
Machinery for Cotton Spinning Plant 14
Machinery for Repair Shop 10
Marking Ink 60
Mercerized Yarn, Strength of 12
Mercerizing Single Yarns 65
Mill Construction 27
Mixing Cotton 73
Mixing Marking Ink 61
Mohair, Specific Gravity of 56
Numbering Braided Banding 36
Numbering Cotton Duck 74
Paste for Cotton Piece Goods 30
Organization Sheets for Cotton Mills 42

PAGE
Pickers, Press Roll on 33
Pickers, Production of 52
Piece Goods, Paste for 30
Pile Fabric, Making Absorbent 79
Ply Yarn, Space in 23
Position of Threads in Ply Yarn 24
Power for Repair Shop 10
Power Required 70
Power for Spinning Plant 16
Power Transmission, Rope in 57
Preparatory Machinery Required for 125 Looms 70
Press Roll on Pickers 33
Prices Paid for Winding Yarn 59
Print Goods, Machinery for 70
Production of Cotton Machinery 17
Production of Drawing Frames and Cards 51
Production of Intermediate and Slubber 50
Production of Jack Frame and Fine Fly Frame 49
Production of Spinning Frames 15, 47
Production of Spooler 66
Program for 60s Yarn 45
Protecting Inventions 13
Recipe for Marking Ink 60
Recipe for Paste to Stand Mangling 30
Recipe for Size 77
Regulating Flat Strips 84
Remedy for Yarn Sticking to Slasher Cylinder 64
Repair Shop for Cotton Mill 9
Roller Cloth 11
Rolls on Slasher 35
Rope Transmission in Textile Mills 57
Rotting Floor in Slasher Room 54
Rule for Spooler Production 66
Sea Island Cotton, Baling of 31
Section of Ply Yarn 25
Settings for Cards 83
Shipping Machinery 37
Silk, Specific Gravity of 57
Single Roving 43
Single Yarns, Mercerizing 65
Size Box, Piping 78
Sizing of Warps for Lawns 77
Sizing on Cotton Yarns 19
Slasher Roll Blanket 35
Slasher Room, Floor for 54
Slipping of Blanket on Slasher 35
Slubber, Production of 50
Small Spinning Mill 34
Soft Twine and Cable Cord Harness 53
Specific Gravity of Textile Fibres 56
Spinning Frame, Production of 15, 47
Spinning Machinery and Power Required for 125 Looms 70

PAGE
Spinning on Small Scale 34
Spooler Production 66
Standard for Numbering Duck 75
Starting New Mill, Cost of 5
Sticky Warps 64
Stoppages, Allowance for 47, 50
Strength of Mercerized Yarn 12
Table of Flat Strips 84
Table of Spooler Production..........67
Take-up in Twisting 24
Take-up in Warp and Filling 62
Temporary Protection for Invention 13
Tension in Twisting 24
Test for Absorbent Cloth 81
Textile Materials, Density of 55
Transmission, Rope..........57
Twist Multiplier 48, 52
Use of Roller Cloth 12
Use of Rope Transmission..........57
Warp Spinning Plant..........14
Warps Sticking to Cylinder 64
Waste, Allowance for 47-52
Weaving, Effect of Sizing on 21
Weight of Cotton Bales 31
Weight per Square Yard 62
White Goods, Size for..........77
Winding, Price Paid for 59
Wood Preservative..........55
Wool, Specific Gravity of 56
Working Program of Drafts, Weights, Speeds and
  Production for 60s Yarn 42
Yarns for Knitting 43
Yarns Used in Braided Banding..........37

C. E. RILEY, TREAS.
BOSTON OFFICE
65 FRANKLIN STREET

SOUTHERN OFFICES
814-815 EMPIRE BLDG.
ATLANTA, GA.

HOWARD & BULLOUGH
AMERICAN MACHINE CO., Ltd.
PAWTUCKET, R. I.

COTTON

MACHINERY

WE BUILD

HOPPER BALE OPENERS
FEEDERS, SELF-FEEDING OPENERS
BREAKER INTERMEDIATE AND
FINISHER LAPPERS

REVOLVING FLAT CARDS
DRAWING FRAMES
SLUBBING INTERMEDIATE
AND ROVING FRAMES

IMPROVED SPINNING FRAMES
NEW MODEL TWISTERS
CONE WINDERS

WARPERS AND SLASHERS

We Invite Investigation and Comparison

Evan Arthur Leigh
232 Summer Street
BOSTON, MASS.
SOLE AGENT IN THE UNITED STATES AND CANADA
FOR
PLATT BROS. & CO., LTD.
OF OLDHAM, ENGLAND
BY FAR THE LARGEST MAKERS IN THE WORLD
OF
COTTON, WOOLEN, and WORSTED
MACHINERY
FOR ALL CLASSES OF WORK
MATHER & PLATT'S
DYEING AND FINISHING MACHINERY
JOSEPH SYKES BROS.'
CARD CLOTHING FOR COTTON
WILSON BROS. BOBBIN CO., Ltd.
BOBBINS AND SHUTTLES
HAIGH'S
DOUBLE LOOP BANDS AND TAPES
DRONSFIELD BROS.
GRINDING TACKLE AND EMERY FILLET
SPECIAL MACHINERY
FOR WORKING COTTON WASTE

UNIVERSAL WINDING MACHINES

Have a wide range of work. Interchangeable parts make the NO. 50 available for

NUTAPER CONES, TUBES OF VARIOUS LENGTHS, OR DOUBLING.

The NO. 90 winds cotton, woolen, worsted or silk

FILLING

On bobbins or cop tubes from cops, frame bobbins, unrolling spools, or direct from skeins at high speed.

THE "UNIVERSAL"

Is the only scientific or complete winding system in existence; it has justified its name by its universal application and adoption throughout the world.

UNIVERSAL WINDING CO.

95 SOUTH STREET
BOSTON

Kitson Machine Shop

Lowell Mass.

MANUFACTURERS OF THE

MORTON SYSTEM

For Opening Bale Cotton in
Store House and Distributing
Same Automatically to Feeder
Hoppers in Picker Room,
Making Breaker Laps Without
a Second Handling of Stock.

A Complete Line of Latest Improved

PICKING MACHINERY AND WASTE WORKING MACHINERY

Lowell Machine Shop

LOWELL, MASS.

Cotton Machinery

¶ Cards, Railway Heads, Drawing Frames, Fly Frames, Speeders, Ring Spinning Frames, Twisters, Spoolers, Reels, Warpers, Slashers, Winders, Looms, Shearing and Brushing Machines, Balling Machines, Folders, Stamping Machines, Sewing Machines, Size Pumps, Size Kettles, Drawing-in Frames, Baling Presses, Indigo Grinders, Camless Winders, Etc.

SOUTHERN OFFICE

Prudential Building Atlanta, Ga.

CARD GRINDERS

We are recognized as authority for everything pertaining to the above. Write and tell us what you want and we will be glad to quote prices.

Also builders of

Warpers, Ballers, Beamers

and

Patent Expansion Combs for Warpers, Beamers and Slashers : ; : :

T. C. ENTWISTLE CO.

FRANK B. KENNEY, Manager

LOWELL, MASS.

KINKS

ON

Roving

Machinery

Ask
Woonsocket Machine
and
Press Company

Woonsocket, R. I.

Books That Help

Barker—Introduction to Study of Textile Design	$2.50
Bradbury—Calculations in Yarns and Fabrics	1.25
Nicholson—Factory Organization and Costs	12.50
Kastanek—Manual of Weave Construction	1.00
Matthews—Textile Fibres	4.00
Nichols—Cost Finding in Cotton Mills	1.50
Thornley—Cotton Combing Machines	3.00
Broadbent—Cotton Manual	.75
Tompkins—Cotton Mill Processes and Calculations	5.00
Tompkins—Cotton Mill, Commercial Features	5.00
Taggart—Cotton Spinning (3 vols.)	7.50
Marsden—Cotton Weaving	3.00
Dobson—Humidity in Cotton Spinning	1.50
Thornley—Mule Spinning	3.00
Bowman—Structure of the Cotton Fibre	3.00
Bean and McCleary—Chemistry and Practice of Finishing	15.00
Bean and Scarisbrick—Chemistry and Practice of Sizing	10.00
Beech—Dyeing of Cotton Fabrics	3.00
Mercerization (2 vols.)	7.50
Rothwell—Printing of Textile Fabrics	6.00

We prepay Postage or Express Charges.

LORD & NAGLE COMPANY
BOSTON, MASS.
SEND FOR COMPLETE CATALOG

IF YOU ARE CONTEMPLATING BUILDING,
OR CHANGING OVER YOUR OLD
MACHINERY, WRITE TO THE

**Metallic Drawing
Roll Company**

FOR PRICES AND ADVANTAGES OF THEIR

METALLIC ROLLS

¶ 25 to 33 per cent more production guaranteed, than can be received from any leather roll : : : : :

**INDIAN ORCHARD
MASS.**

JAN 14 1910

THE

WHITIN MACHINE WORKS

WHITINSVILLE, MASS.

Cards
Combers
Drawing Frames
Roving Frames
Spinning Frames

Spoolers
Twisters
Reels
Long Chain Quillers
Looms

Builders of

Cotton Machinery

SOUTHERN AGENT

STUART W. CRAMER

Charlotte, N. C.   Atlanta, Ga.

THE RABBETH
CENTRIFUGAL CLUTCH SPINDLE

Is being adopted in large numbers in the best mills. Over

1,300,000

ordered up to October 1, 1909. They can be obtained in new frames through any of the standard builders, and for replacement of old spindles, directly at our works.

OUR MIRROR SPINNING RINGS
Trade Mark Reg. U. S. Pat. Off.

are the best on the market and set the standard for quality.

DRAPER COMPANY

One copy del. to Cat. Div.

Ga.

JAN 18 1910

LIBRARY OF CONGRESS
0 018 446 260 6